

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Applicant: James A. Thomson  
Serial No.: 08/376,327  
Filed: January 20, 1995  
Title: PRIMATE EMBRYONIC STEM CELLS

Art Unit:

Examiner:

Atty Docket: 960296.92905

Date: October 3, 1995

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GROUP 1600

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Transmitted herewith is an amendment in the above-identified patent application.

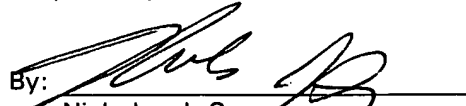
The fee for that amendment has been calculated as shown below:

CLAIMS AS AMENDED

	Claims After Amendment		Highest Number Paid For Previously	Number Extra	Rate	Additional Fee
Total Claims		Minus		0 X	\$11.00	= \$.00
Independent Claims		Minus		0 X	\$39.00	= \$.00
First presentation of a Multiple Dependent Claim					\$125.00	= \$.00
					Total Fee	\$.00

- ☒ [X] No additional fee is required.
- ☐ [ ] A check for \$ .00 to cover the filing fee and the cost of recording the assignment is enclosed.
- ☒ [X] The Commissioner is hereby authorized to charge any additional fees which may be required or credit any overpayment to Account No. 17-0055. An extra copy of this sheet is enclosed.

Respectfully submitted,

By:   
Nicholas J. Seay  
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# United States Patent [19]

Thomson

US005,843,780A

[11] Patent Number: 5,843,780

[45] Date of Patent: Dec. 1, 1998

## [54] PRIMATE EMBRYONIC STEM CELLS

[75] Inventor: James A. Thomson, Madison, Wis.

[73] Assignee: Wisconsin Alumni Research Foundation, Madison, Wis.

[21] Appl. No.: 591,246

[22] Filed: Jan. 18, 1996

### Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 376,327, Jan. 20, 1995.

[51] Int. Cl.<sup>6</sup> ..... C12N 5/06

[52] U.S. Cl. .... 435/363; 435/366; 435/373

[58] Field of Search ..... 435/363, 366, 435/373

### [56] References Cited

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5,453,357 9/1995 Hogan ..... 435/7.21  
5,591,625 1/1997 Gerson et al .

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Primary Examiner—Michael P. Woodward  
Assistant Examiner—Brenda G. Brumback  
Attorney, Agent, or Firm—Quarles & Brady

### [57] ABSTRACT

A purified preparation of primate embryonic stem cells is disclosed. This preparation is characterized by the following cell surface markers: SSEA-1 (-); SSEA-3 (+); SSEA-4 (+); TRA-1-60 (+); TRA-1-81 (+); and alkaline phosphatase (+). In a particularly advantageous embodiment, the cells of the preparation have normal karyotypes and continue to proliferate in an undifferentiated state after continuous culture for eleven months. The embryonic stem cell lines also retain the ability, throughout the culture, to form trophoblast and to differentiate into all tissues derived from all three embryonic germ layers (endoderm, mesoderm and ectoderm). A method for isolating a primate embryonic stem cell line is also disclosed.

11 Claims, 8 Drawing Sheets



US005843780A

**United States Patent** [19]**Thomson**[11] **Patent Number:** **5,843,780**[45] **Date of Patent:** **Dec. 1, 1998**[54] **PRIMATE EMBRYONIC STEM CELLS**[75] **Inventor:** James A. Thomson, Madison, Wis.[73] **Assignee:** Wisconsin Alumni Research Foundation, Madison, Wis.[21] **Appl. No.:** 591,246[22] **Filed:** Jan. 18, 1996**Related U.S. Application Data**[63] **Continuation-in-part of Ser. No. 376,327, Jan. 20, 1995.**[51] **Int. Cl.<sup>6</sup>** C12N 5/06[52] **U.S. Cl.** 435/363; 435/366; 435/373[58] **Field of Search** 435/363, 366, 435/373[56] **References Cited****U.S. PATENT DOCUMENTS**

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